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The program of this conference is symptomatic of the troubles and problems that have increasingly beset American agriculture during the past twenty years. Certainly the idea of having such a symposium as this would not have occurred to anyone during the World War. At that time the urgency was to make two blades of wheat grow where one grew before. In this European War we are wondering what to do with the second blade we have succeeded so well in growing. Crop surpluses are, I take it, one of the chief concerns of this conference.

It is generally agreed that three major factors have operated to bring about surplus conditions--the decline of foreign trade, advances in science and technology, and widespread unemployment.

Mr. Milo Perkins, of the Surplus Marketing Administration, writing in December "Harper's Magazine", says of foreign trade: "Troubles for farmers who have been producing for the export market are likely to continue for some years .... The pressure of our present surpluses is likely to lead to a demand for economic appeasement--feeding and clothing a Hitler-dominated Europe .... The only lasting cure is to build up domestic consumption to replace the vanished foreign demand."

The effect of advances in the science of farming has recently been the subject of careful study by the Bureau of Agricultural Economics. Their publication, "Technology on the Farm", concludes that it is neither possible nor desirable to turn the clock backward. We shall continue to mechanize farms, displace farm labor, develop higher yielding crops, and stamp out disease. We now know how to assure abundance of food and clothing for any probable population of the United States; but we must learn how to handle that new thing in mankind's history- abundance.

Agriculture can hardly be expected to find the cure for industrial unemployment, but one thing is certain there is a tremendous undeveloped market for foods among low income families. From the minimum dietary point of view there is a shocking amount of under consumption.

Thus it appears that the results of all three of these surplus-producing factors can be offset only by learning how to make intelligent use of the surpluses here at home. Over a long period it should be possible for the United States to adjust its economy in a way that will permit expansion of production in both industry and agriculture. That would make possible a higher level of living for the entire population.

(Presented before California Agricultural Economic Conference, Stockton, California, December 17, 1940)

which has grown up around this audacious idea of defeating perishability. For one thing, at the same moment that the magnitude of the task was visibly expanding, accustomed means of expansion were being denied to us, one after the other The most unimaginative can see what shortages of sheet steel and tin portend It is equally easy to see how vital it is to make the best possible use of every cubic foot of cargo space on ocean going vessels. Not so immediately obvious, perhaps, is the necessity for conservation of domestic transport, both by rail and by truck, whether through elimination of wasteful cross-hauling, through full loading and quick turn around, through reduction of spoilage en route, or through semi-processing and reduction of weight and bulk close to the point of origin

The group with which I am connected is deeply engaged in attack on some of these problems. One of the promising avenues of approach is food dehydration, since both weight and bulk may be very greatly reduced. The major emphasis of the work is being placed at present on the dehydration of vegetables and eggs

Dehydration of foods is one of the three major traditional ways of defeating perishability. the other two, of course, being sterilization by heat and holding under tight seal - that is, canning, and storage at low temperature, especially below freezing. The drying of foods to make them keep is a very old art, and one which has been brought to a high degree of perfection in the case of such farm products as fruits On the other hand, the development of satisfactory methods for dehydrating vegetables has lagged. The coming of the emergency found this country possessed of only a few relatively small plants in which vegetable dehydration was being carried on commercially Surveys indicated that the total amount dried during the year 1940 was less than 1 percent of the amount commercially canned or frozen, and by far the largest part of this production was for use in dehydrated soup mixtures A certain amount of technical information was available, most of it dating from the shipping crisis of the last war The flurry of activity in dehydration at that time died down shortly after the close of the war, apparently because the products had little consumer appeal It remains to be seen whether further development of the art will so far improve dehydrated vegetables that they will achieve an important place in the post war economy of farm products Preliminary results of the research which is now being carried on at the Western Regional Research Laboratory indicate that this is a real possibility

The problems of rapid emergency expansion of the industry are quite different, however, from those which would have to be solved in the course of normal peacetime growth In particular, wartime shortages of the commonest engineering materials make new plant construction a complex puzzle for the engineering designer The engineer finds the supply of steel, of galvanized sheets, of monel metal or stainless sheets, of pipe, valves, and fittings, of blowers, of motors, and of all kinds of preparation and handling machinery is short and almost sure to become shorter; some important items are obtainable only on defense priorities Ingenuity in the use of alternatives and expedients becomes all important For example, it may be essential to devise means for transporting many of the scarcer items of equipment from one dehydrator to another, in order to take advantage of differences in harvest season and to increase the load factor of the equipment Refinements which would serve only to make minor savings in operating cost may be put aside The attainment of maximum production of a satisfactory product within the shortest possible time becomes the single objective

I have spoken of this particular project not alone because it illustrates so well the peculiar urgencies and difficulties of wartime development, but also because it illustrates the kind of permanent constructive achievement which may grow out of an emergency effort If the pressure of necessity drives us to the discovery and application of substantial improvements in the technique of dehydration, agriculture should be a permanent gainer; for we shall have established a third means of defeating perishability, which can take its place in our economy alongside of canning and freezing

Consideration of the points at which wartime shortages are already beginning to hurt makes me believe there are numerous other great opportunities for American agriculture opportunities which we might overlook were it not for the peremptory challenge of war The difficulties and the opportunities - cover an extraordinarily wide area of our normal American way of life. The old Army-Navy list of strategic and critical materials has expanded within a few months to embrace more than three hundred commodities. Some of them are household words rubber, tin, aluminum, steel. Others are so unfamiliar that only a specialist would recognize them, and yet they too are essential cogs in our complex American machine

One of the brightest glories of our peacetime economy was its cosmopolitanism The clipper ships, trading in strange ports more than a century ago, started it We became familiar with the remarkable elastic curd prepared from the milky sap of a tropical tree; with the narcotic gum exuded by the Oriental poppy; with the peculiar minerals from a hundred remote provinces of the earth We have become so accustomed to these and a thousand other commodities from overseas that we forget entirely the magnitude of our dependence on them When disaster cuts off the supply we find that the task of reordering our mode of life is staggering I wonder whether any of us have yet visualized what a real shortage of rubber will mean in the way of readjustments. So the case stands thus: that while this far ranging commerce of ours has given the average American an unexampled variety of ways in which he can spend his pay check, it has made the fabric of our economy peculiarly vulnerable to disturbances in any part of the world

There is another facet to this question We have been the most prodigal, the most wasteful, nation on earth We have wasted our soil, our forests, our oil and natural gas, and we have been wealthy enough to buy and waste the precious, irreplaceable things our ships brought from the far corners of the earth Too often our flippant attitude has been, "What has posterity ever done for us, that we should worry about them?" No doubt in our customary optimism we have assumed that posterity would have the talent and ingenuity to work out alternatives But now we find ourselves suddenly compelled to work out some of these solutions ahead of time to accomplish in a few months or a few years some of the miracles that our peacetime wastefulness might not force on us for another fifty years

American agriculture has a double interest in this problem - an interest as a great consumer of the missing commodities, and an interest as a potential supplier of alternatives, or replacements. Of course, there is a whole group of material shortages, principally among the metals, which simply cannot be overcome by utilizing farm products; organic chemistry holds out no hope of synthesizing good electrical conductors like copper. But there are many other scarce materials for which replacements are perfectly possible, and on these possibilities research and development are being pushed with the utmost speed While some of this work has military significance, so that discussion would be inadvisable, it is no secret that research is being pursued

on the development of rubberlike materials from farm products; on modification of American animal and vegetable oils to produce new drying and soap oils; on the use of cotton for some purposes formerly reserved for imported fibers; on the production of plastic structural materials from low cost farm wastes and residues; on the development of domestic root starches; on the extraction of vitamin concentrates from domestic commodities; on the production of tanning materials from American sources; on the recovery of alcohol and numerous other essential organic chemicals and solvents from common farm products; and on numerous other fronts of present or prospective shortage.

These are all opportunities for American agriculture, particularly if the developments are so sound that they continue on the force of their own merit into the postwar economy. Agriculture, like any other industry, gains when the field of utilization of its products is broadened and diversified.

The agricultural engineer will be key man in the effort to reach many of these objectives. Further reductions in the manpower required per unit of production will be essential in many cases. Revolutionary changes in methods of planting, tilling, harvesting, and handling some crops may be required. The necessity for economy of transportation and of investment in processing plants will put a high premium on the development of primary processing steps and storage facilities close to the farm. Failure to reach acceptable solutions to these problems will not only hold back the war effort, but will also seriously jeopardize the conversion of war emergency measures into permanent postwar industries.

As Secretary Wickard said, everyone of us must help to keep production rolling. It is our good fortune that success in meeting this challenge may also contribute largely to the richness and security of the peacetime world.

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